

Notes

1. Students are expected to understand the operator precedence rules of the listed operators.
2. The increment/decrement operators `++` and `--` are part of the AP Java subset. These operators are used only for their side effect, not for their value. That is, the postfix form (for example, `x++`) is always used, and the operators are not used inside other expressions. For example, `arr[x++]` is not used.
3. Students need to understand the “short circuit” evaluation of the `&&` and `||` operators.
4. Students are expected to understand “truncation towards 0” behavior as well as the fact that positive floating-point numbers can be rounded to the nearest integer as

`(int)(x + 0.5)`, negative numbers as `(int)(x - 0.5)`.

5. String concatenation `+` is part of the AP Java subset. Students are expected to know that concatenation converts numbers to strings and invokes `toString` on objects.
6. User input is not included in the AP Java subset. There are many possible ways for supplying user input: e.g., by reading from a `Scanner`, reading from a stream (such as a file or a URL), or from a dialog box. There are advantages and disadvantages to the various approaches. The exam does not prescribe any one approach. Instead, if reading input is necessary, it will be indicated in a way similar to the following:

```
double x = /* call to a method that reads a floating-point number */;
```

or

```
double x = ...; // read user input
```

7. Both arrays of primitive types (e.g., `int[]`, `int[][]`) and arrays of objects (e.g., `Student[]`, `Student[][]`) are in the subset.
8. Students need to understand that 2-dimensional arrays are stored as arrays of arrays. For the purposes of the AP CS A Exam, students should assume that 2-dimensional arrays are rectangular (not ragged) and the elements are indexed in row-major order. For example, given the declaration

```
int[][] m = {{1, 2, 3}, {4, 5, 6}};
```

`m.length` is 2 (the number of rows), `m[0].length` is 3 (the number of columns), `m[r][c]` represents the element at row `r` and column `c`, and `m[r]` represents row `r` (e.g., `m[0]` is of type `int[]` and references the array `{1, 2, 3}`).

Students are expected to be able to access a row of a 2-dimensional array, assign it to a 1-dimensional array reference, pass it as a parameter, and use loops (including for-each) to traverse the rows. However, students are not expected to analyze or implement code that replaces an entire row in a 2-dimensional array, such as

```
int[][] m = {{1, 2, 3}, {4, 5, 6}};
```

```
int[] a = {7, 8, 9};
```

```
m[0] = a; // Outside the Subset
```